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ABSTRACT

This self-paced student training module on safety when using power tools is one of a number of modules developed for Pre-apprenticeship Phase 1 Training. Purpose of the module is to familiarize students with general safety rules and uses of commonly used electrical, pneumatic, hydraulic, and powder-actuated tools. The module may contain some or all of the following: a cover sheet listing module title, goal, and performance indicator; study guide/checklist with directions for module completion; introduction; information sheets providing information and graphics covering the module topic(s); self-assessment; self-assessment answers; post assessment; and post-assessment answers. (YLB)

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ED217274

INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP PHASE 1 TRAINING

OCCUPATIONAL SAFETY

POWER TOOLS

CE032910

Goal:

The student will become familiar with general safety rules and uses of commonly used electrical, pneumatic, hydraulic and powder-actuated tools.

Performance Indicators:

The student will demonstrate proficiency in the safe use of power tools by successfully completing a Self Assessment and Post Assessment exam, or by completing two assignments.

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Study Guide

This study guide is to be used by the student as a "blueprint" to successfully complete this module. Please complete all of the following steps, and check them off as you complete them.

1. ____ Familiarize yourself with the Goals and Performance Indicators of this module. This will give you an overall view of what the module contains and what you'll have to do to complete it.

2. ____ Study the Information section thoroughly. This will provide you with the knowledge necessary to pass the exams.

3. ____ Complete the Assignment as instructed on the Assignment page. The Assignment is intended not only to make you better aware of the principles discussed in the Information section, but it is intended to be part of the requirement for successfully completing the module.

4. ____ Take the Self-Assessment Exam which follows the Assignment page. The exam is designed to determine whether you have learned enough from the Information section and your assignment to successfully complete the Post Assessment exam.

   You may refer to the Information section for assistance, but if you have too much trouble with the Self Assessment portion, you should re-study the Information section before going on to step 5. Compare your Self Assessment answers with those on the Self Assessment answer sheet immediately following the Self Assessment exam.

5. ____ Complete the Post Assessment exam and turn it in to your instructor for grading. It is recommended that you score 90% or better on the Post Assessment before going on to the next module.

Information

This module covers safety procedures for the most commonly-used electric, pneumatic, hydraulic and powder-actuated tools used in and around the construction industry. Many of the rules for operating these tools--as for the operation of hand tools--require only common sense. For example, every worker should know the following: electric tools must have grounding wires or insulated cases to prevent shock; electrical cords must be examined prior to use for insulation or prong damage; proper cord sizes should be used to prevent overheating and fires; plugs should be removed from receptacles carefully to avoid wire damage; switches should be in good operating condition and should be in "off" position before the cord is plugged in; adjust and clean power tools only when the tool is unplugged, and be cautious when plugging in a power cord for another worker.

ELECTRIC

PORTABLE CIRCULAR SAW SAFETY

1. Must be equipped with a fixed guard over the upper half of the blade and a working movable guard over the lower half.
2. Saw blade should clear the stock being cut by no more than 1/8 inch.
3. Use the recommended blade, the proper size, in good condition, and installed correctly.
4. Never block or tie the guard back.
5. Allow the saw to cut without forcing.
6. Check material to be cut for nails, grit, or any material that may interfere with cutting.
7. Always check for the lower guard return before putting the saw down.
8. Adequately support the material to be cut to prevent binding.
9. Allow the saw blade to come to full speed before cutting to prevent overloading and possible kickbacks.
10. Hold the saw firmly, do not allow it to pull out of your hands.
11. Saw in the forward motion only, never backwards.

12. Clean sawdust from around the movable guard often and before using to insure it works properly.
13. Do not over-reach.
14. Never try to cut a curve or other than in a straight line with a portable circular saw.

RECIPROCATING HAND SAWS

1. Select the proper blade for the material used and the cut to be made.
2. Hold the saw firmly.
3. When making a plunge cut, feed the blade in slowly with the base of the saw setting on the material.
4. Hold the base against the material being cut.

POWER HACKSAW SAFETY

1. Securely clamp stock to be sawed.
2. Turn the saw on and lower the blade on to the stock slowly.
3. Allow the saw to cut at its own rate.
4. Support long stock to prevent buckling.
5. Use the correct blade; make sure it is sharp, and mounted to cut on the power stroke. Use coolant if necessary.
6. Metal may be hot and have a sharp burr after being hacksawed.
7. Set blade tension at manufacturer's recommendation.

PNEUMATIC TOOL SAFETY

1. Pneumatic tool hoses must be secured to prevent accidental disconnection.
2. Compressed air can be used for cleaning only if pressure is less than 30 pounds per square inch (PSI) and it is used with an effective chip guard.
3. Any pneumatic hose over 1/2-inch in diameter must have a safety valve at the source that reduces pressure if the hose fails.
4. Couplings between hoses must have a safety connection in case the couplings fail to hold.
5. All pneumatic nailers with automatic feed and that operate with over 100 PSI pressure must have a safety device on the muzzle to prevent the nailer from ejecting when not in contact with the work surface. It is wise to have this feature on all nailers.
6. Never point a nailer or stapler at anyone. When carrying them, point them toward the floor.
7. Never use pneumatic hoses for hoisting anything.

8. Use a dryer and filter to prevent moisture and dirt from entering the tool.
9. Be sure hose and fittings are in good condition and securely fastened before opening the air-line valve.
10. Never exceed the manufacturer's recommended pressure for tools.
11. Wear proper personal protection when using pneumatic tools.
12. When work is completed, shut the air supply off and then run the tool to drain the line before disconnecting.

SPRAYER SAFETY

1. Do not exceed air pressure recommended by manufacturer. A blowup could occur.
2. When spraying, wear respiration protection and work in a well ventilated area only.
3. Never spray near ignition hazards.
4. Do not point the sprayer at anyone.

HYDRAULIC POWER TOOL SAFETY

1. Hydraulic fluid must be fire resistant and approved by the United States Bureau of Mines.
2. Never exceed the manufacturer's recommended safe operating pressure for hoses, pipes, fitting, filters, and controls.
3. Never touch a stream of hydraulic fluid from a leak. The fluid under pressure can cause serious injuries.

POWDER-ACTUATED TOOL SAFETY

1. Powder-actuated tools must be checked out and tested before loading each day. If not in good working order, they must not be used until repaired.
2. Do not load powder-actuated tools until just before using them.
3. Never point them at anyone, whether loaded or not.
4. Hearing and eye protection must be worn along with any other necessary personal protection.
5. Never allow hands or fingers in front of the open barrel end.
6. Never leave the tool unattended when using it, even if it is unloaded. Return it to its case and put away where unauthorized personnel cannot get it.
7. Leave protective guards in place.
8. There must be a safety device to prevent firing in case the tool is

dropped or while it is being loaded and unloaded.

9. There must be a safety device that prevents firing if the muzzle is tilted over eight degrees.
10. There must be a safety device that prevents the tool from firing unless the muzzle is pressed against the material surface.
11. Use low velocity piston type tools whenever possible.
12. Only those trained and qualified by an authorized dealer or distributor should be allowed to use powder-actuated tools.
13. Do not use powder-actuated tools where there is a combustion or explosion hazard.

FASTENER (STUD GUN) SAFETY

1. Do not drive fasteners into very hard or brittle materials such as:
   a. Cast iron
   b. Glazed tile
   c. Surfaced hardened steel
   d. Glass block
   e. Face brick
   f. Hollow tile

COMPRESSOR SAFETY - Even though compressors are actually powered by electric motors or gasoline engines, they will be covered here because of their direct use with pneumatic tools.

1. Air storage tanks on compressors must be approved by the American Society of Mechanical Engineers (A.S.M.E.) and have this approval permanently stamped into them.
2. Drain the water out of the storage tanks at least daily, to prevent rust through and weak points.
3. Compressed air storage tanks must be equipped with a working safety relief valve to prevent exploding.
4. Keep the relief valve and pressure gauge in good working condition.

Assignment

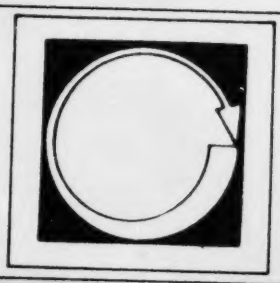
Select any two of the following three assignments to complete instead of taking the Self Assessment and Post Assessment exams.

1. List, step-by-step all of the safety practices that you perform when operating at least two of the electrical, pneumatic, hydraulic, or powder-actuated tools which you use in your work.

2. Write a short report for your instructor, citing at least eight power tool violations at your job site, and explain what can be done to correct the violations.

3. Have your instructor show you or demonstrate to you at least five power tools which are in unsafe condition or unsafe use, and you point out the faults.

Self Assessment



Select the answer which best completes the statement. Write the letter of that answer in the blank to the left of the statement.

1. ____ All electric tools must have:
   a. cover guards
   b. grounding wires
   c. guard covers
   d. receptacles

2. ____ Circular saws should be used to cut:
   a. in the forward motion only
   b. in the backward motion only
   c. in non-ferrous woods
   d. crooked cuts

3. ____ One of the requirements for using compressed air for cleaning is that:
   a. pressure is less than 15 pounds per square foot
   b. pressure is less than 30 pounds per square foot
   c. pressure is less than 15 pounds per square inch
   d. pressure is less than 30 pounds per square inch

4. ____ Regarding pneumatic tool use, hose couplings should be:
   a. fitted with a safety connection
   b. subjected to no more than 15 pounds per square inch
   c. made of 1/2-inch hose
   d. fitted by compressed air

5. ___ When carrying a pneumatic nailer or stapler, always:
   a. point it toward the ceiling
   b. point it toward the floor
   c. point it toward your leg
   d. point it toward a wall

6. ___ If the operator exceeds the air pressure recommended by the manufacturer:
   a. a blowup could occur
   b. ignition could occur
   c. paint droplets will condense
   d. the nozzle could get plugged up

7. ___ Hydraulic fluid must be:
   a. fire resistant
   b. filter resistant
   c. stored in sub-freezing containers
   d. streak-proof

8. ___ Powder-actuated tools should be equipped with a safety device to prevent discharge:
   a. unless the muzzle is pressed against material
   b. at all times
   c. until the tool is dropped
   d. which is a low velocity piston

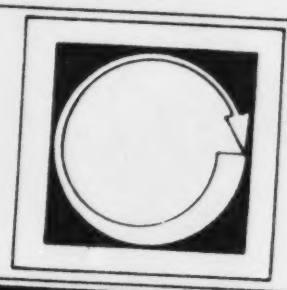
9. ___ Fasteners should not be driven into:
   a. extremely hard or brittle materials
   b. concrete
   c. wood
   d. particle board

10. ___ Air storage tanks on compressors must be approved by:
   a. American Society of Mechanical Engineers
   b. American Society of Mining Engineers
   c. American Society of Compressor Engineers
   d. American Society of Pressure Engineers

Self Assessment Answers

1. b
2. a
3. d
4. a
5. b
6. a
7. a
8. a
9. a
10. a

Post Assessment



Select the answer which best completes the statement. Write the letter for that answer in the blank at the left of each statement.

1. ____ With which of the following tools would you likely find coolant being used?
   a. circular saw
   b. reciprocating saw
   c. pneumatic stapler
   d. power hack saw

2. ____ Compressed air can be used for cleaning only if the pressure is less than:
   a. 30 pounds per square inch (PSI)
   b. 3 PSI
   c. 60 PSI
   d. 15 PSI

3. ____ When you're finished using a pneumatic tool, you should:
   a. disconnect the air line, then shut the air supply off
   b. shut the air supply off, then disconnect the line
   c. disconnect the air line, then allow it to drain
   d. allow the line to build up pressure until the next job

4. ____ Any pneumatic hose over 1/2" in diameter should have a safety valve that reduces pressure if the hose fails. The safety valve should be located at:
   a. the source
   b. the tip
   c. the coupling
   d. the dryer

5. ____ In operating a portable circular saw, the saw blade should clear the stock by:
   a. 2-3 inches
   b. 1/4 inch
   c. 1/8 inch or less
   d. no more than 1/2 inch

6. ____ A portable circular saw must have a fixed guard over the upper half of the blade and:
   a. a fixed guard over the bottom half of the blade
   b. a portable guard over the bottom half of the blade
   c. a working movable guard over the bottom half of the blade
   d. a flexible guard over the bottom half of the blade

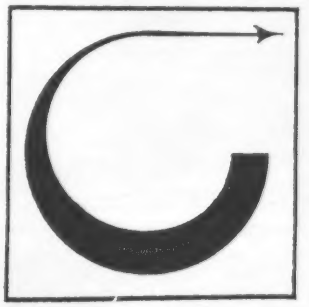
7. ____ Starting the saw and allowing it to come to full speed before cutting will prevent:
   a. overloading
   b. buckling
   c. burrs
   d. blade tension

8. ____ Couplings between hoses must have:
   a. safety valves
   b. safety harnesses
   c. safety connections
   d. safety tensions

9. ____ Hydraulic fluid must be:
   a. warmed before use
   b. purplish in color
   c. fire resistant
   d. used in powder-actuated tools

10. ____ Fasteners can be driven into:
   a. cast iron
   b. glass block
   c. both of the above
   d. none of the above

Instructor Post Assessment Answers



1. d
2. d
3. b
4. a
5. c
6. c
7. a
8. c
9. c
10. d